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6560-50-P

ENVIRONMENTAL PROTECTION AGENCY

[EPA-HQ-OAR-2021-0299; FRL-8193-02-OAR]

Notice of Request for Approval of Alternative Means of Emission Limitation

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice and request for comments.

SUMMARY: On April 21, 2020, Flint Hills Resources (FHR) requested an alternative means of emission limitation (AMEL) under the Clean Air Act (CAA) in order to utilize a leak detection sensor network (LDSN) with a detection response framework (DRF) at its West and East Refineries located in Corpus Christi, Texas. In this document, the EPA is soliciting comment on all aspects of the AMEL request and resulting alternative leak detection and repair (LDAR) requirements that are necessary to achieve a reduction in emissions of volatile organic compounds (VOC) and hazardous air pollutants (HAPs) at least equivalent to the reduction in emissions required by the applicable LDAR standards. This document also presents and solicits comment on all aspects of a framework for future LDSN-DRF AMEL requests, which would afford the EPA the ability to evaluate those requests in a more efficient and streamlined manner.

DATES: *Comments*. Comments must be received on or before **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].**

Public hearing: If anyone contacts us requesting a public hearing on or before **[INSERT DATE 5 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, the EPA will hold a virtual public hearing on **[INSERT DATE 15 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. Please refer to the **SUPPLEMENTARY INFORMATION** section for additional information on the public hearing.

ADDRESSES: You may send comments, identified by Docket ID No. EPA-HQ-OAR-2021-0299, by any of the following methods:

- Federal eRulemaking Portal: *https://www.regulations.gov/* (our preferred method). Follow the online instructions for submitting comments.
- Email: *a-and-r-docket@epa.gov*. Include Docket ID No. EPA-HQ-OAR-2021-0299 in the subject line of the message.
- Fax: (202) 566-9744. Attention Docket ID No. EPA-HQ-OAR-2021-0299.
- Mail: U.S. Environmental Protection Agency, EPA Docket Center, Docket ID No. EPA-HQ-OAR-2021-0299, Mail Code 28221T, 1200 Pennsylvania Avenue, NW, Washington, DC 20460.
- Hand Delivery or Courier (by scheduled appointment only): EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Avenue, NW, Washington, DC 20004. The Docket Center's hours of operation are 8:30 a.m. – 4:30 p.m., Monday – Friday (except Federal holidays).

Instructions. All submissions received must include the Docket ID No. for this rulemaking. Comments received may be posted without change to *https://www.regulations.gov/*, including any personal information provided. For detailed instructions on sending comments and additional information on the rulemaking process, see the **SUPPLEMENTARY INFORMATION** section of this document. Out of an abundance of caution for members of the public and our staff, the EPA Docket Center and Reading Room are closed to the public, with limited exceptions, to reduce the risk of transmitting COVID-19. Our Docket Center staff will continue to provide remote customer service via email, phone, and webform. We encourage the public to submit comments via *https://www.regulations.gov/* or email, as there may be a delay in processing mail and faxes. Hand deliveries and couriers may be received by scheduled appointment only. For further information on EPA Docket Center services and the current status, please visit us online at *https://www.epa.gov/dockets*.

FOR FURTHER INFORMATION CONTACT: For questions about this action, contact Ms. Karen Marsh, Sector Policies and Programs Division (E143-05), Office of Air Quality Planning and Standards (OAQPS), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; telephone number: (919) 541-1065; fax number: (919) 541-0516; and email address: *marsh.karen@epa.gov*.

SUPPLEMENTARY INFORMATION:

Participation in virtual public hearing. Please note that the EPA is deviating from its typical approach for public hearings because the President has declared a national emergency. Due to the current Centers for Disease Control and Prevention (CDC) recommendations, as well as state and local orders for social distancing to limit the spread of COVID-19, the EPA cannot hold in-person public meetings at this time.

To request a virtual public hearing, contact the public hearing team at (888) 372-8699 or by email at *SPPDpublichearing@epa.gov*. If requested, the virtual hearing will be held on **[INSERT DATE 15 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].** The hearing will convene at 9:00 a.m. Eastern Time (ET) and will conclude at 3:00 p.m. ET. The EPA may close a session 15 minutes after the last pre-registered speaker has testified if there are no additional speakers. The EPA will announce further details at *https://www.epa.gov/stationary-sources-air-pollution/alternative-means-emission-limitation-leak-detection-and-repair*.

If a public hearing is requested, the EPA will begin pre-registering speakers for the hearing upon publication of this document in the *Federal Register*. To register to speak at the virtual hearing, please use the online registration form available at *https://www.epa.gov/stationary-sources-air-pollution/alternative-means-emission-limitation-leak-detection-and-repair* or contact the public hearing team at (888) 372-8699 or by email at *SPPDpublichearing@epa.gov*. The last day to pre-register to speak at the hearing will be **[INSERT DATE 12 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. Prior to the hearing, the EPA will post a general agenda that will list pre-registered speakers in approximate order at: *https://www.epa.gov/stationary-sources-air-pollution/alternative-means-emission-limitation-leak-detection-and-repair*.

The EPA will make every effort to follow the schedule as closely as possible on the day of the hearing; however, please plan for the hearing to run either ahead of schedule or behind schedule.

Each commenter will have 5 minutes to provide oral testimony. The EPA encourages commenters to provide the EPA with a copy of their oral testimony electronically (via email) by emailing it to Karen Marsh, email address: *marsh.karen@epa.gov*. The EPA also recommends submitting the text of your oral testimony as written comments to the rulemaking docket.

The EPA may ask clarifying questions during the oral presentations but will not respond to the presentations at that time. Written statements and supporting information submitted during the comment period will be considered with the same weight as oral testimony and supporting information presented at the public hearing.

Please note that any updates made to any aspect of the hearing will be posted online at *https://www.epa.gov/stationary-sources-air-pollution/alternative-means-emission-limitation-leak-detection-and-repair*. While the EPA expects the hearing to go forward as set forth above, if requested, please monitor our website or contact the public hearing team at (888) 372-8699 or by email at *SPPDpublichearing@epa.gov* to determine if there are any updates. The EPA does not intend to publish a document in the *Federal Register* announcing updates.

If you require the services of a translator or a special accommodation such as audio description, please pre-register for the hearing with the public hearing team at (888) 372-8699 or by email at *SPPDpublichearing@epa.gov* and describe your needs by **[INSERT DATE 7 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. The EPA may not be able to arrange accommodations without advance notice.

Docket. The EPA has established a docket for this rulemaking under Docket ID No. EPA-HQ-OAR-2021-0299. All documents in the docket are listed in Regulations.gov. Although listed, some information is not publicly available, *e.g.*, Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy. Publicly available docket materials are available electronically in Regulations.gov.

Instructions. Direct your comments to Docket ID No. EPA-HQ-OAR-2021-0299. The EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *https://www.regulations.gov/*, including any personal information provided, unless the comment includes information claimed to be CBI or other information whose disclosure is restricted by statute. Do not submit electronically any information you consider to be CBI or other information whose disclosure is restricted by statue. This type of information should be submitted by mail as discussed below.

The EPA may publish any comment received to its public docket. Multimedia submissions (audio, video, etc.) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. The EPA will generally not consider comments or comment contents located outside of the primary submission (*i.e.*, on the Web, cloud, or other file sharing system). For additional submission methods, the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit *https://www.epa.gov/dockets/commenting-epa-dockets*.

The *https://www.regulations.gov/* website allows you to submit your comment anonymously, which means the EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an email comment directly to the EPA without going through *https://www.regulations.gov/*, your email address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, the EPA recommends that you include your name and other contact information in the body of your comment and with any digital storage media you submit. If the EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, the EPA may not be able to consider your comment. Electronic files should not include special characters or any form of encryption and be free of any defects or viruses. For additional information about the EPA's public docket, visit the EPA Docket Center homepage at *https://www.epa.gov/dockets*.

The EPA is temporarily suspending its Docket Center and Reading Room for public visitors to reduce the risk of transmitting COVID-19. Written comments submitted by mail are temporarily suspended and no hand deliveries will be accepted. Our Docket Center staff will continue to provide remote customer service via email, phone, and webform. We encourage the public to submit comments via *https://www.regulations.gov/*. For further information and updates on EPA Docket Center services, please visit us online at *https://www.epa.gov/dockets*.

The EPA continues to carefully and continuously monitor information from the CDC, local area health departments, and our Federal partners so that we can respond rapidly as conditions change regarding COVID-19.

Submitting CBI. Do not submit information containing CBI to the EPA through *https://www.regulations.gov/* or email. Clearly mark the part or all of the information that you claim to be CBI. For CBI information on any digital storage media that you mail to the EPA, mark the outside of the digital storage media as CBI and then identify electronically within the digital storage media the specific information that is claimed as CBI. In addition to one complete version of the comments that includes information claimed as CBI, you must submit a copy of the comments that does not contain the information claimed as CBI directly to the public docket through the procedures outlined in *Instructions* section above. If you submit any digital storage media that does not contain CBI, mark the outside of the digital storage media clearly that it does not contain CBI. Information not marked as CBI will be included in the public docket and the EPA's electronic public docket without prior notice. Information marked as CBI will not be disclosed except in accordance with procedures set forth in 40 Code of Federal Regulations

(CFR) part 2. Send or deliver information identified as CBI only to the following address: OAQPS Document Control Officer (C404-02), OAQPS, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, Attention Docket ID No. EPA-HQ-OAR-2021-0299. Note that written comments containing CBI and submitted by mail may be delayed and no hand deliveries will be accepted.

Acronyms and abbreviations. We use multiple acronyms and terms in this document. While this list may not be exhaustive, to ease the reading of this document and for reference purposes, the EPA defines the following terms and acronyms here:

AMEL	alternative means of emission limitation
AVO	audio, visual, or olfactory
AWP	Alternative Work Practice
CAA	Clean Air Act
CBI	Confidential Business Information
CDC	Center for Disease Control and Prevention
CDX	Central Data Exchange
CFR	Code of Federal Regulations
DRF	detection response framework
DT	detection threshold
DTA	average DT value
DTU	upper limit of the detection threshold band
eDTA	DTA for equivalency
EPA	Environmental Protection Agency
EST	eastern standard time
FHR	Flint Hills Resources
FID	flame ionization detector
HAPs	hazardous air pollutants
HC	hydrocarbon
LDAR	leak detection and repair
LDSN	leak detection sensor network
LDSN-DRF	leak detection sensor network-detection response framework
OAQPS	Office of Air Quality Planning and Standards
OGI	optical gas imaging
PID	photoionization detector
ppb	parts per billion
ppm	parts per million
ppmv	parts per million by volume
PSL	potential source location
QA/QC	quality assurance/quality control
VOC	volatile organic compounds

Organization of this document. The information in this document is organized as follows:

B. AMEL
II. Request for AMEL
A. FHR West Refinery and East Refinery LDSN-DRF
B. EPA's Analysis of FHR's AMEL Request
III. EPA Framework for Streamlining Evaluation of Future LDSN-DRF AMEL Requests
IV. AMEL for the Mid-Crude and Meta-Xylene Process Units at the FHR West Refinery
V. Request for Comments

I. Statutory and Regulatory Background

A. LDAR Requirements

Numerous EPA air pollutant control standards require specific work practices for LDAR. These work practices require the periodic inspection of designated components for leaks. The work practice currently employed requires the use of an instrument which meets the requirements specified in Method 21 of appendix A-7 of 40 CFR part 60 (hereafter referred to as EPA Method 21). The portable instrument is used to detect leaks of VOC (including organic HAPs) at the leak interface of individual components. The work practice requires periodic monitoring of each component. A "leak" is generally defined as an exceedance of a specified concentration in parts per million (ppm), as measured with EPA Method 21.[1]

In their request, FHR cites various LDAR requirements in 40 CFR parts 60, 61, and 63, which apply to the Mid-Crude and Meta-Xylene process units at the FHR West Refinery in Corpus Christi, Texas. These requirements are included in Table 1.[2]

TABLE 1. SUMMARY OF APPLICABLE LDAR RULES THAT MAY APPLY TO THE PROCESS UNITS AT THE FHR CORPUS CHRISTI WEST REFINERY

Applicable rules with LDAR requirements	**Emission reduction required and rule citation**	**Provisions for AMEL**
40 CFR part 60, subpart VV (New Source Performance Standards (NSPS VV))	60.482-2, 60.482-3, 60.482-7, 60.482-8, and 60.482-10.	60.484

[1] As an alternative to this standard work practice, the Alternative Work Practice (AWP) located at in 40 CFR 60.18 and 40 CFR 63.11 may be used. The AWP employs the use of optical gas imaging (OGI) for most leak detection surveys, with one annual EPA Method 21 survey. When using OGI, a "leak" is defined as any emissions imaged by the OGI instrument.
[2] EPA prepared Table 1 using information provided in the request, corrected as appropriate based on its own review of the regulations. However, the EPA has not independently verified whether Table 1 includes all of the regulatory requirements with which these process units must comply.

40 CFR part 60, subpart VVa (NSPS VVa)	60.482-2a, 60.482-3a, 60.482-7a, 60.482-8a, and 60.482-10a.	60.484a
40 CFR part 60, subpart GGG (NSPS GGG)	60.482-2, 60.482-3, 60.482-7, 60.482-8, and 60.482-10, by reference from 60.592.	60.484
40 CFR part 60, subpart GGGa (NSPS GGGa)	60.482-2a, 60.482-3a, 60.482-7a, 60.482-8a, and 60.482-10a, by reference from 60.592a.	60.484a
40 CFR part 60, subpart QQQ (NSPS QQQ)	60.692-2 and 60.692-5.	60.694
40 CFR part 61, subpart FF (Benzene Waste Operations NESHAP (BWON))	61.343, 61.344, 61.345, 61,346, 61.347, and 61.349.	61.353(a); also see 61.12(d)
40 CFR part 63, subpart F (Hazardous Organic NESHAP (HON))	63.102.	63.162(b) by reference.
40 CFR part 63, subpart H (HON)	63.163, 63.164, 63.168, 63.172, 63.173, 63.174, 63.175, and 63.178.	63.162(b); 63.177
40 CFR part 63, subpart CC (Refinery Maximum Achievable Control Technology (MACT))	*FHR notes that the process units are complying with the requirements in NSPS VV and VVa, where appropriate to comply with Refinery MACT.	

The applicable rules shown in Table 1 require periodic monitoring of each regulated component (*e.g.,* pump, valve, connector, closed vent system, etc.) with an EPA Method 21 instrument. The frequency of such monitoring may vary from monthly to every four years depending on the subpart and the component being monitored. If a leak is found on a component, the component is tagged and repaired within a specified time.

The current LDAR work practice involves placing an EPA Method 21 instrument probe at the leak interface (seal) of a component and registering a VOC concentration (which includes the concentration of organic HAP).[3] The EPA has established concentration thresholds which define a leak. The EPA's leak definition varies from 500 ppm to 10,000 ppm depending on the type of component and the specific subpart. If the concentration registered by the EPA Method 21 instrument exceeds the applicable leak definition, then the component must be repaired or replaced.[4] For some component types (*e.g.,* components in heavy liquid service), sensory

[3] See section 8.3.1 of Method 21 of appendix A-7 of 40 CFR part 60.
[4] Replacement may include the use of low-emissions valves or valve packing, where commercially available.

monitoring or audio, visual, or olfactory (AVO) monitoring is required. A leak identified with AVO must also be repaired or replaced within a specified time.

B. AMEL

The LDAR requirements in each of the subparts listed in Table 1 were established as work practice standards pursuant to CAA sections 111(h)(1) or 112(h)(1). For standards established according to these provisions, CAA sections 111(h)(3) and 112(h)(3) allow the EPA to permit the use of an AMEL by a source if, after notice and opportunity for comment,[5] it is established to the Administrator's satisfaction that such an AMEL will achieve emissions reductions at least equivalent to the reductions required under the applicable CAA section 111(h)(1) or 112(h)(1) standards. As noted in Table 1 of this document, many of the identified NSPS and NESHAP also include specific regulatory provisions allowing sources to request an AMEL.

II. Request for AMEL

A. FHR West Refinery and East Refinery LDSN-DRF

In this section, the EPA is providing a summary of the AMEL request submitted by FHR. The AMEL that the EPA is proposing is described in section IV of this preamble. As described in section II.B of this preamble, the proposed AMEL contains specific changes to the AMEL request submitted by FHR.

The LDSN-DRF proposed by FHR consists of a continuously operated LDSN and specialized facility practices and procedures defined in a DRF. Leak detection sensor nodes are installed to provide coverage of all LDAR applicable components in the process unit. The short-term excursion of an individual sensor's output above its baseline level is called a "peak", which represents a potential emission detection. A web-based analytics platform automatically acquires and analyzes the real-time data from the sensor nodes, along with wind and facility information, to issue a potential source location (PSL) notice for this "peak". The PSL identifies a location of

[5] CAA section 111(h)(3) requires that the EPA provide an opportunity for a hearing.

interest where there is a possible leak. The size of the PSL can vary depending on the data collected by the system. The facility then deploys a team to locate and repair the emission source within the PSL (DRF). Implementation of the requested LDSN-DRF is intended to replace the periodic monitoring of all components in a process unit. The LDSN-DRF focuses on the timely detection of significant emissions and the facility's ability to more rapidly mitigate leaks. Therefore, FHR seeks an alternative means of complying with the EPA Method 21 and AVO requirements in the subparts summarized in Table 1.

In its April 21, 2020, request, FHR indicates that it plans to install and operate a LDSN in process units subject to LDAR requirements at its West and East Refineries located in Corpus Christi, Texas. FHR has the requested LDSN installed in the FHR West Refinery Mid-Crude and Meta-Xylene process units currently. Those installations were part of a multi-year Cooperative Research and Development Agreement (CRADA) between FHR, Molex, and the EPA Office of Research and Development (ORD) Center for Environmental Measurement and Modeling.[6] FHR has requested broad approval of the AMEL for the LDSN-DRF system for all process units at the FHR West and East Refineries through this application. FHR states that if broad approval is provided, they would use a phased approach to install a LDSN in additional process units across the FHR West and East Refineries. While FHR is requesting to generally utilize the LDSN-DRF in place of the required EPA Method 21 and AVO monitoring, FHR does state there may be process units, or portions of process units, where the current work practice would continue. According to FHR, these situations could be based on the following examples: phased deployment/installation schedules for sensors, longer distance between LDAR components, unfavorable cost-benefit analysis, chemical detectability, equipment location remoteness, or other considerations. FHR's request states that records will be maintained to clearly demonstrate

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[6] During the CRADA, FHR remained subject to the LDAR requirements in the applicable subparts, including the EPA Method 21 and AVO monitoring.

which portions of the individual process unit(s) are complying with EPA Method 21, the AWP, and the LDSN-DRF AMEL.

1. LDSN

As previously discussed, the LDSN consists of leak detection sensor nodes that are positioned within a facility process unit and continuously monitor for leaks. The sensors record data approximately once every second. Any short-term excursion of an individual sensor's output above its baseline (*i.e.,* peak) represents a potential emission detection. FHR states in their request that the most critical elements for demonstrating equivalency with the EPA Method 21 work practice include sensor selection and sensor node placement.

Sensor selection is based on the responsivity of the sensor to the chemicals of interest. According to FHR's request, the sensors used in the FHR LDSN will have response factors of less than or equal to 10 for the targeted LDAR applicable process streams. The response factor is the ratio of the known concentration of a compound to the measured reading of an appropriately calibrated sensor. The higher the response factor, the lower the sensitivity of the sensor to the chemical.[7] Following the same response factor threshold required by EPA Method 21, FHR suggests LDAR applicable process streams and their components with average response factors greater than 10 for the selected sensor are not eligible for the LDSN alternative and must instead continue to comply with the applicable LDAR requirements.

FHR further states sensor node placement will affect the detection threshold (DT) of an individual sensor, as in general, leaks that are closer to a sensor can be detected at smaller emission rates than leaks that are farther away from the source. The DT is a translation of concentration measurements from EPA Method 21 to the ability of the sensor to detect the leak. FHR's request states that sensor node placement will follow a site assessment, design,

[7] If the process stream is a mixture, the response factor is calculated for the average composition of the process stream. Average stream compositions may be based on sample data, feed or product specifications, or process knowledge. Response factors may be based on published data, test results, or generally accepted calculation methodologies.

optimization, and installation process such that all components within the LDSN boundaries that are subject to EPA Method 21 monitoring in the applicable subparts would have sensor coverage. This also includes sensor coverage for elevated components and those located on multi-level structures.

As described in the CRADA report,[8] the team conducted a series of tests to establish procedures aimed at optimizing sensor node placement so that any leak within the LDSN perimeter would be detected by one or more sensors. Instead of assigning a single method detection limit like most analytical test methods, the LDSN sensors have a range of detection thresholds ("DT band") that can be represented with EPA Method 21-type ppm values across the sensor coverage radius. As explained in the CRADA report, the DT band was derived from the measurement with EPA Method 21 of known mass rate releases of isobutylene and an array of sensors at different distances and heights. The DT of an individual sensor is dependent on several factors, including the size of leak, the distance a leak is from the sensor, the sensitivity of the detector, the responsiveness of the chemicals of interest, and the wind conditions. For each sensor, there is a DT band across the sensor coverage radius. The controlled-release trials conducted through the CRADA indicate that an isobutylene leak of 1.42 g/hr or greater should be detectable within a 50-foot radius of the sensor node.[9]

For purposes of modeling the effectiveness of the LDSN-DRF system compared to the EPA Method 21 program, Molex utilized different estimates of the center point of the DT band, referred to as average DT values (DTA), and accounted for distance from the sensor to the leak. This allowed FHR to determine which DTA is necessary, and at what distance between sensors, for equivalence to be achieved through the model. The models for the Meta-Xylene process unit were shown to be equivalent or better than the EPA Method 21 work practice for all modeled scenarios, with significant emissions reductions observed when distance effects were

[8] See Docket ID No. EPA-HQ-OAR-2021-0299.
[9] See section 3 of CRADA report located at Docket ID No. EPA-HQ-OAR-2021-0299.

incorporated into the simulations. The Mid-Crude process unit also demonstrated equivalency for two of the three emission control scenarios modeled. Through the results of these simulations, FHR is requesting to use a DTA for equivalency (eDTA) of 11,250 ppm in the Meta-Xylene process unit and 12,500 ppm in the Mid-Crude process unit at the FHR West Refinery because these values resulted in equivalent emission reductions from the LDSN-DRF system as the EPA Method 21 program.[10] More details of the results of the simulations can be found in section 4 of the CRADA report.[11]

In addition to the eDTA, FHR's request includes the upper limit of the detection threshold (DTU), which is the DT value that represents the smallest leak that could be detected by the sensor network at the furthest distance away from the sensor. The DTU was not used directly in the simulations discussed above. Instead, the DTU was calculated from the eDTA using the following equation: DTA = (DTU+DTL)/2, where DTL represents the lower value of the DT band. Because the DTL can be very small, particularly when a sensor is right next to the leak, FHR and Molex used a conservative estimate of 1.5 times the DTA to calculate the DTU required to achieve equivalency in total emissions reductions. FHR indicated this DTU is useful for establishing the design criteria for the number and placement of sensors and can provide verification of performance through EPA Method 21 sampling of components via spot checks.

According to FHR's request, a DTU of 18,000 ppm was used in Molex's simulations as the DTU required for equivalency and would indicate that all leaks greater than or equal to 18,000 ppm would trigger a PSL notification to facility personnel. In addition to the leaks above the DTU, additional leaks within the DT band would trigger a PSL notification depending on the distance from a sensor node and meteorological conditions. As described below, FHR defines

[10] See Table B-3 of the CRADA report located at Docket ID No. EPA-HQ-OAR-2021-0299. EPA Method 21 monitoring schedule used for modeling was annual for connectors, monthly for pumps, and quarterly for valves and other components.

[11] See section 4 of CRADA report located at Docket ID No. EPA-HQ-OAR-2021-0299.

sensor coverage by the overall system eDTA and DTU values listed below, with individual sensor nodes having a 50-foot radius.

In summary, FHR requests the following eDTA and DTU values for the FHR West and East Refineries:

- Meta-Xylene process unit at FHR West Refinery: eDTA = 11,250 ppm; DTU = 18,000 ppm;
- Mid-Crude process unit at FHR West Refinery: eDTA = 12,500 ppm; DTU = 18,000 ppm; and
- All other process units at FHR West and East Refineries: eDTA = 12,000 ppm; DTU = 18,000 ppm.

Changes to process equipment are common within process units. These may include installation of new equipment, modifications to existing equipment, or changes in service. These types of changes go through a change management process that includes an environmental review to determine potential changes to regulatory applicability and requirements. FHR states that they will use their existing management of change processes to review future changes to process equipment and systems in the process units. This review will include determining if sensor selection and placement remains adequate, or if updates or additional sensors are necessary to ensure coverage by the system maintains the eDTA and DTU values requested. FHR states that this management of change process is a basic foundational process that is used throughout the refining, petrochemical, and chemical industries.

2. LDSN Quality Assurance/Quality Control (QA/QC)

In addition to sensor selection and sensor placement, FHR's request outlines several QA/QC measures specific to the requested LDSN. The following paragraphs describe these measures as outlined in FHR's request.

Initial Calibration and Set-up. Prior to deployment, FHR's request states that each sensor will be calibrated by the manufacturer. Once installed, each sensor will be tested for responsivity and wireless communication by challenging it with a standard isobutylene gas or other appropriate standard. The test results from this initial calibration are maintained in the software package that FHR plans to use for the LDSN-DRF system, called mSyte.

Periodic Responsivity Test. In their request, FHR states the sensitivity of each installed sensor will be measured and recorded at least quarterly by conducting a “bump test” using an isobutylene standard. According to FHR, a successful bump test is a response of the sensor that exceeds 50 percent of the nominal value of the standard.

Continuous Sensor Check. FHR proposes to continuously monitor each sensor for power outage, loss of data transmission, and sensor baseline levels. The mSyte system will contain the current status of each sensor, as well as historical data. The mSyte system will send a notification to facility personnel when any failure or significant deviation from preset threshold values occurs. FHR states that failed sensors will be reset, repaired, or replaced.

Meteorological Data. The FHR West and East Refineries have an existing wind sensor that FHR states will be checked at the same frequency as the bump tests of the LDSN sensor nodes to ensure the wind sensor is properly oriented to the north. Wind data collected from this wind sensor will be compared to data from the meteorological station located at the FHR refineries at least once per calendar year. The status of the meteorological station is monitored continuously through mSyte system for possible loss of communication.

System Operational Availability. As proposed by FHR, the LDSN is a continuous monitoring system, with each sensor recording approximately one reading per second. FHR states that these high data collection rates help optimize the LDSN’s detection capability, thus providing more targeted PSLs and more efficient leak identification during the DRF inspection process. Further, FHR notes that system maintenance, sensor checks, sensor failures, or other technical reasons may result in partial downtime of the LDSN system. FHR’s request states the average operational downtime of the LDSN system will not exceed 10 percent. When issues arise, FHR intends to make repairs to the LDSN system as soon as practicable.[12]

Sensor Data. FHR proposes a compliance assurance method that the EPA or state inspectors could use to verify operation effectiveness of the LDSN system using random EPA Method 21 sampling. FHR's proposed random sampling would indicate a compliance issue if a statistically significant number of EPA Method 21 readings are greater than 1.2 times the DTU on LDAR applicable components within the LDSN boundary where active PSL leak investigations are not pending or ongoing. FHR suggests the factor of 1.2 times the DTU represents the variability that occurs in the EPA Method 21 measurement process.

3. DRF

The LDSN system automatically detects, categorizes, and approximates the location of emissions in the monitored process unit based on sensor location, sensor output and meteorological measurements. The LDSN notifies selected facility personnel of detected emission anomalies so that appropriate action can be taken under the DRF. This section describes FHR's requested DRF.

The DRF includes the work practices that are employed to identify the specific source of emissions and to make appropriate repairs. For every notification from the LDSN, a PSL with a discrete serialized identification number is provided to facility operators. This PSL is a visual representation of the area in which there is high probability that fugitive emissions are present, thus providing a targeted area for leak investigation.

The purpose of the PSL investigation is to identify the source of emissions needing repairs. Investigations are initiated within three days of a PSL notification. FHR intends to utilize various emissions screening methods in order to locate the emissions source(s). This may include handheld portable equipment such as VOC analyzers, optical gas imaging (OGI), or other appropriate detectors for the chemicals of interest. Once identified, EPA Method 21 is performed

[12] FHR's request does not specify a clear deadline by when repairs would be made.

on the emissions source to document the maximum concentration reading, and repairs begin. Each component identified with a maximum concentration reading greater than the leak definitions specified in Table 2 is considered a leak needing repair. The leak definitions in the table follow those defined in the applicable LDAR regulations for the process units at the FHR West and East Refineries. It is important to note that FHR's request does not include conducting EPA Method 21 on every LDAR-applicable component in the PSL during the investigation. Instead, FHR proposes that when at least one component has been identified with a maximum concentration greater than or equal to 3,000 ppm, this component is presumed to be the emissions source and no further investigation is required. In this case, once the leak has been successfully repaired, the PSL is closed.

In addition, some PSL notifications are triggered by multiple smaller leaks that are close together. To account for this potential leak cluster effect, FHR proposes that when at least three components have been identified with a maximum concentration less than 3,000 ppm but greater than the applicable leak definition as specified in Table 2, that collection of components is presumed to be the emissions source and no further investigation is required. Once those smaller leaks are successfully repaired, the PSL is closed. This threshold of 3,000 ppm was chosen by FHR based on EPA ORD's model that took into consideration the occurrence of small leaks in a cluster generating a PSL. In EPA ORD's model, a single leak greater than or equal to 3,000 ppm or three leaks with concentrations less than 3,000 ppm was found equivalent in 95 percent of the model simulations, and thus equivalent to the current work practice.

Where the emission source is not identified after 30 minutes of active searching during the initial PSL investigation, FHR proposes to stop the investigation for seven days. During these seven days, the LDSN will continue to collect data for analysis, which helps refine the PSL. Within seven days of the initial investigation, a second investigation will be conducted. If this second investigation does not identify the emission source, and the PSL detection level increases to twice the initial level, a PSL update notification is sent using the increased detection level, and a new investigation is started within three days. This step is repeated each time the leak is not located. FHR further proposes that if the emission source has not been identified and the PSL has not updated within 14 days or more, the PSL is automatically closed. Finally, if after 90 days the emission source is not identified and the PSL has not updated, FHR states that one final screening will be conducted and the PSL will be closed with an indication that no leak source was found.

In summary, FHR proposes that a PSL is closed when one of the following criteria is met:

- One or more leaks ≥3,000 ppm is found and repaired;
- Three or more leaks <3,000 ppm are found and repaired;
- Malfunction, startup, or shutdown activity or other authorized emissions are identified and documented;
- Components on delay of repair have been repaired and monitored to verify repair;
- A leak source has not been identified and the PSL has not updated within 14 days or more; or
- A leak source has not been identified after multiple investigations and it has been 90 days without the unidentified potential leak source worsening (*i.e.,* PSL detection level increasing to twice the previous detection level).

After a PSL is closed, FHR's request states that if the LSDN shows new positive detections above the threshold, a new PSL is generated and notification is issued. This starts a new DRF investigation process.

FHR's request states that the applicable leak repair requirements in 40 CFR part 60, subparts VV, VVa, GGG, GGGa, and QQQ, 40 CFR part 61, subpart FF, and 40 CFR part 63, subparts H and CC would remain in effect for components subject to LDAR (*i.e.,* pumps, valves, connectors, and agitators). These requirements include an initial repair attempt within five days of leak confirmation with EPA Method 21 maximum concentration reading above the applicable leak definition, and final successful repair within 15 days of leak detection. Additionally, delay of repair, as allowed in the applicable subparts, would still apply to leaks detected with the LDSN-DRF system.

Table 2 summarizes the applicable leak definitions for various component types, including non-LDAR components that are identified as leaking by the LDSN-DRF system.

TABLE 2. APPLICABLE LEAK DEFINITIONS FOR COMPONENTS IN THE LDSN-DRF SYSTEM

LDSN Leak Source Classification	**Leak Source Component Class**	**LDSN Leak Definition**	**Initial Repair Attempt**	**Final Effective Repair**	**Final Repair Confirmation**
LDAR Component Leak – “LDAR”	Agitator – FF	500 ppm	5 days	15 days	<500 ppm
LDAR Component Leak – “LDAR”	Agitator – VV	2,000 ppm	5 days	15 days	<2,000 ppm
LDAR Component Leak – “LDAR”	Agitator – HON	10,000 ppm	5 days	15 days	<10,000 ppm
LDAR Component Leak – “LDAR”	Compressor – HON	500 ppm	5 days	15 days	<500 ppm
LDAR Component Leak – “LDAR”	Compressor – non HON	2,000 ppm	5 days	15 days	<2,000 ppm
LDAR Component Leak – “LDAR”	Compressor in Hydrogen Service	AVO	5 days	15 days	No AVO indication
LDAR Component Leak – “LDAR”	Connector	500 ppm	5 days	15 days	<500 ppm
LDAR Component Leak – “LDAR”	Pump – with permit specifying 500 ppm	500 ppm	5 days	15 days	<500 ppm
LDAR Component Leak – “LDAR”	Pump – HON	1,000 ppm	5 days	15 days	<1,000 ppm
LDAR Component Leak – “LDAR”	Pump – VV	2,000 ppm	5 days	15 days	<2,000 ppm
LDAR Component Leak – “LDAR”	Valve	500 ppm	5 days	15 days	<500 ppm
Non-LDAR Component Leak – “Emission Event”	Agitator – Hydrocarbon	10,000 ppm	Follow emission event reporting and repair guidelines		<10,000 ppm

	(HC) but non LDAR				
Non-LDAR Component Leak – "Emission Event"	Compressor – HC but non LDAR	2,000 ppm	Follow emission event reporting and repair guidelines		<2,000 ppm
Non-LDAR Component Leak – "Emission Event"	Connector – HC but non LDAR	500 ppm	Follow emission event reporting and repair guidelines		<500 ppm
Non-LDAR Component Leak – "Emission Event"	Pump – HC but non LDAR	2,000 ppm	Follow emission event reporting and repair guidelines		<2,000 ppm
Non-LDAR Component Leak – "Emission Event"	Relief Device – HC but non LDAR	500 ppm	Follow emission event reporting and repair guidelines		<500 ppm
Non-LDAR Component Leak – "Emission Event"	Valve – HC but non LDAR	500 ppm	Follow emission event reporting and repair guidelines		<500 ppm
Non-LDAR Component Leak – "Emission Event"	Other	500 ppm	Follow emission event reporting and repair guidelines		<500 ppm
"Authorized Emission"[1]	Authorized Emission	N/A	N/A	N/A	N/A

[1]Authorized emissions may include emissions from a stack or otherwise allowed. These emissions are not considered equipment leaks for purposes of this AMEL.

B. EPA's Analysis of FHR's AMEL Request

This section addresses specific aspects of FHR's request.

1. Equivalence Demonstration

FHR submitted both a pilot study and an analysis of the LDSN system requirements that would achieve equivalent emissions reductions to compliance with the currently required leak detection program at the two process units in question.[13] This submission includes (1) simulation modeling that was used to determine the level of performance of the LDSN that is necessary to achieve equivalent emission reductions and (2) results from a pilot study conducted in the specific process units for which this AMEL is requested. Based on the EPA's analysis of the

[13] As part of EPA's review of this modeling, we considered the closure of the Consent Order for the Corpus Christi Refinery and reviewed records of the LDAR program during the 2019 calendar year and did not identify issues with the program that would affect the basis for the equivalency.

simulation modeling results, and the pilot study results, plus the EPA's comparison of the proposed work practice standards for the AMEL in section IV applied to the data collected in the pilot study, the EPA finds that this proposed AMEL would achieve at least equivalent emission reductions as the EPA Method 21 requirements to which these process units are subject. Our analysis of the submission is discussed below.

a. *Modeling demonstration*.

Molex and EPA ORD[14] used historical leak data and a Monte-Carlo simulation method to generate a profile of leak events, and then calculated mass emissions under two scenarios: (1) the applicable EPA Method 21 requirements and (2) the LDSN with certain assumptions about its performance. The Monte-Carlo analysis indicates that the LDSN, when operated with specified performance criteria, is at least equivalent to the current EPA Method 21 work practice. However, there are several assumptions that could affect this conclusion. For example, the simulation method did not account for variability in the LDSN with respect to certain data quality allowances such as downtime. However, as discussed further in section II.B.3 of this preamble, the EPA did analyze the effects of downtime on the equivalence modeling.

As stated in the CRADA report, the equivalency modeling was limited to the process units included in the CRADA pilot study (Meta-Xylene and Mid-Crude) and was not designed to provide conclusions about other potential LDSN installations. Overall, the modeling demonstrates that the LDSN-DRF system may take time to reach a level of steady-state control, though this is also common for a LDAR program based on EPA Method 21. Therefore, the EPA generally accepts the analysis as valid but solicits comments on this approach.

b. *Pilot study results*. FHR conducted multi-month pilot studies of the LDSN-DRF in the Mid-Crude and Meta-Xylene process units. The pilot study started in May 2019 for the Meta-Xylene unit and in July 2019 for the Mid-Crude unit. The pilot studies ended in November 2019 for both units. FHR deployed fixed-place networks of 10.6 electron volt photoionization

[14] See section 4 of the CRADA report located at Docket ID No. EPA-HQ-OAR-2021-0299.

detectors for the pilot studies; the network consisted of 38 sensor nodes for the Mid-Crude unit and 10 sensor nodes for the Meta-Xylene unit. During the pilot studies, LDAR inspections with EPA Method 21 continued to be conducted at the required frequency.

To evaluate the results of the pilot study, the EPA examined inspection information extracted from FHR's leak database to compare leaks identified with the LDSN-DRF and those identified with the required EPA Method 21 monitoring. First, we removed components outside the area of the LDSN, as well as components that will remain under the standard work practice, as these components are not relevant for demonstrating the efficacy of the LDSN-DRF in practice. A summary of the EPA's results of this comparison is included in Table 3.

TABLE 3. COMPARISON OF EPA METHOD 21 AND LDSN-DRF RESULTS.

	Mid-Crude		Meta-Xylene	
	EPA Method 21	LDSN-DRF	EPA Method 21	LDSN-DRF
Number of leaks	23	33	58	64
Smallest leak, ppm	540	582	500	564
Largest leak, ppm	81,568	100,000	100,000	100,000
Mean of leaks, ppm	13,036	21,904	4,415	14,052

For the Mid-Crude process unit, of the 33 leaks found by LDSN-DRF, 11 were for components that are subject to AVO inspection, two were components added to the leak database, and six were due for an inspection, as the unit had been down prior to installation of the LDSN. For the remaining 14 components, the LDSN found leaks an average of 240 days sooner than the next scheduled inspection, with a range of 14 to 359 days. For the Meta-Xylene process unit, of the 64 leaks found by LDSN, 10 were for components that are either subject to AVO inspection, one was a component added to the leak database, one was on delay of repair, and one was due for an inspection. Additionally, five of the PSLs generated at the Meta-Xylene process unit were for new leaks on components where leaks were previously discovered and fixed because of the LDSN-DRF. Because both leaks occurred prior to when the next scheduled EPA Method 21 inspection would have occurred, the analysis only considered the original leak found by the LDSN. For the remaining 46 components, the LDSN-DRF found leaks an average of 127 days sooner than the next required EPA Method 21 inspection, with a range of 13 to 360 days.

To estimate the emissions from component leaks not captured by the LDSN-DRF, we assumed that the component had been leaking for half of the time from the previously passed EPA Method 21 inspection, unless that timeframe exceeded the start date of the pilot study; in that case, the component was assumed to be leaking from the time the pilot study started until the leak was found. The emissions were then calculated using the correlation equations in EPA's *Protocol for Equipment Leak Emission Estimates*.[15] Petroleum industry equations were used for the Mid-Crude process unit and Synthetic Organic Chemical Manufacturing Industry (SOCMI) equations were used for the Meta-Xylene process unit.[16] The emissions from the leaks not found by the LDSN totaled 338 kg for the Meta-Xylene process unit and 39 kg for the Mid-Crude process unit.[17] To estimate the emissions reductions achieved by the LDSN-DRF, we calculated the number of days from when the component was fixed to the next required EPA Method 21 inspection. We then calculated the emissions using the correlation equations mentioned above. The estimated emissions reductions totaled 1,977 kg for the Meta-Xylene process unit and 43 kg for the Mid-Crude process unit. Additional emissions reductions would likely be achieved by finding and fixing leaks from the components listed as AVO. However, because these components are not surveyed on a regular frequency, it is difficult to quantify how long the leak might have occurred without the LDSN.

In addition to this direct comparison of LDAR components, the LDSN found two leaks in the Meta-Xylene process unit and 20 leaks in the Mid-Crude process unit that were outside of the designated covered area or outside of the LDAR program. Because many of these leaks were not from traditional LDAR components, it is difficult to quantify the emissions reductions from the

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[15] Available at: *https://www.epa.gov/sites/production/files/2020-09/documents/protocol_for_equipment_leak_emission_estimates.pdf*

[16] Pegged emission rate leak factors were used for leaks at and above 100,000 ppm.

[17] Three components in the EPA Method 21 inspection set were leaking at the time the pilot study began. These may not have been picked up by the LDSN because the system may have already marked them as known leakers. However, we have included them in the emissions summary to be conservative.

LDSN-DRF. However, 11 of the leaks found at the Mid-Crude process unit were for traditional LDAR components that will not be covered by the LDSN-DRF. For these 11 components alone, we estimated an emissions reduction of 278 kg.

During the pilot studies, several leaks above 18,000 ppm (the DTU) were identified with EPA Method 21 monitoring that were not identified with the LDSN-DRF (six leaks at the Mid-Crude process unit and three leaks at the Meta-Xylene process unit). Based on these results, FHR determined that six new sensors were needed in the Mid-Crude process unit in order to achieve the level of performance required for equivalence. For the Meta-Xylene process unit, FHR states they believe that the three leaks above the DTU identified with EPA Method 21 monitoring were included within active PSLs with investigations that were not yet completed. They used this information to improve their PSL tracking mechanism. It is not clear to the EPA that additional sensors are not warranted in the process unit. However, the compliance assurance measures that we are proposing in the AMEL should address any continued issues with the design of the LDSN-DRF system for these process units. Further, FHR will conduct an analysis to ensure the system meets the DTU requirements in Section IV.A.

2. Scope of AMEL Approval

Process units covered by AMEL. FHR has requested approval for the use of the LDSN-DRF in all process units located at the FHR West and East Refineries in Corpus Christi, Texas. However, the data provided for the equivalency demonstration is limited to the Mid-Crude and Meta-Xylene process units at the FHR West Refinery. As a result, the EPA is unable to evaluate the appropriate DTA and DTU values for other process units located at these refineries through this request. Therefore, the evaluation of the AMEL and subsequent proposed approval is limited to the implementation of the LDSN-DRF in the Mid-Crude and Meta-Xylene process units at the FHR West Refinery.

Standards covered by AMEL. As summarized in Table 1, FHR has requested approval to implement the LDSN-DRF as an alternative to EPA Method 21 monitoring, AVO monitoring, and monitoring to demonstrate that closed vent systems and equipment designated with no detectable emissions are not leaking. However, FHR also notes that the equivalency simulations do not include leaks identified through AVO monitoring. It is not possible to determine if the LDSN-DRF will result in emission reductions at least equivalent to the AVO monitoring requirements of the applicable subparts. Therefore, the AMEL specified in Section III does not allow the use of the LDSN-DRF as an alternative to the required AVO monitoring.

In the applicable subparts, annual monitoring of closed vent systems with EPA Method 21 is required. These vent systems are closed because they are used to route emissions to control devices. Closed vent systems are subject to a leak definition of 500 ppm with EPA Method 21. Similarly, some components are designated for no detectable emissions, which is demonstrated by an EPA Method 21 instrument reading of less than 500 ppm. These are emissions standards for both types of equipment and leaks are not supposed to occur. Emissions standards are not eligible for AMEL. Therefore, the AMEL specified in Section IV does not allow the use of the LDSN-DRF as an alternative to the EPA Method 21 monitoring requirements for closed vent systems and components designated for no detectable emissions, including pressure relief devices.

3. LDSN Specifications

Operational Downtime. As noted in FHR's AMEL application, high data collection rates are necessary to meet the DTU design criteria. Nevertheless, system maintenance, sensor checks, sensor failures, or other technical reasons may result in partial downtime of the LDSN system. FHR's request included an average operational downtime of the LDSN system of no more than 10 percent. FHR further proposed an average operational downtime for each sensor of no more than 30 percent. This large amount of downtime for individual sensors was due in part to how FHR defined operational downtime, which included periods of data deemed invalid. FHR proposed that half of the time between a failed bump test and the previously passed bump test would be considered invalid data. We agree that a high data collection rate of all sensors is necessary for the LDSN to operate in a manner that provides equivalent emissions reductions. While we recognize that some downtime of the sensors is inevitable, a downtime of 30% for each sensor does not provide a high data collection rate. Our understanding is that during the downtime of an individual sensor, adjacent sensors will be able to detect larger mass leaks but will not detect leaks at the detection level. Taking into consideration that a detection is based on a 72-hour period and that the sensors work together to determine where leaks may be occuring, adverse effects from short duration downtime periods of one sensor are not anticipated. Therefore, the AMEL specified in section IV of this preamble applies a narrower definition for sensor operation downtime and limits the downtime of each individual sensor to no more than 10 percent on a rolling annual basis, determined each month. The AMEL defines operational downtime as periods when a sensor does not provide data or is out of control.

As part of our review of the AMEL request, the EPA performed modeling to determine the effect of downtime on the equivalence of the LDSN-DRF system. For this analysis, the EPA used the model that was developed by EPA ORD and modeled a scenario in which the detection of any leaks was delayed over random periods of time by up to 36 days per year. This is equivalent to a 10 percent network-wide downtime, where all sensors are down at the same time continuously for 10 percent of the year, which is the worst-case scenario for the downtime allowed by the AMEL specified in Section IV. The EPA ORD model was modified in the following ways:

- For each of the 1,000 Monte Carlo Simulations, a random 36-day period of downtime was generated for each of the three years covered in the model.
- For each simulation, if a leak detection would have been made by the LDSN during the downtime period, the date of detection was changed to the day after the downtime ended.
- New total emissions were calculated for each detection method and simulation.

Table 4 summarizes the results of the model with and without downtime. The numbers represent the percentage of Monte Carlo simulations where emissions were lower based on the various sensor network detection scenarios as compared to two different Method 21 scenarios. “DTA” represents the detection threshold average scenario, “DT_” represents the detection threshold scenario, and “DTC” represents the detection threshold cluster scenario. The assumptions for these scenarios are described in Appendix E of the CRADA report located at Docket ID No. EPA-HQ-OAR-2021-0299. For purposes of Table 4, “M21” represents running EPA Method 21 on all components, including connectors, while “C21” represents excluding connectors. Including downtime reduced the percentage of scenarios where the sensor network outperformed EPA Method 21 by at most 2 percent.[18]

TABLE 4. RESULTS OF LDSN DOWNTIME MODELING

	Standard Model			**Model with Downtime**		
Detection	DTA	DT_	DTC	DTA	DT_	DTC
M21	20.5	72.9	94.3	19.4	71.2	92
C21	94.4	99.9	100	93.2	99.6	100

Sensor Detection Criteria. The requested AMEL did not specify a detection criterion for the individual sensors. The proposed AMEL specified in Section IV of this notice requires the sensors in the LDSN to be capable of maintaining a detection floor of less than 10 part per billion (ppb) by volume isobutylene equivalent (ppbe) on a rolling 10-minute average. The detection floor is defined as three times the local standard deviation. To determine the detection floor, the previous 10 minutes of data is used, excluding data when transient peaks above the noise baseline indicate emission detections. The detection floor must be adjusted for the system response to the most recent bump test. Signals above the detection floor are considered emission detections. Section IV.A(a)(2) includes an equation for determining the detection floor.

[18] See Docket ID No. EPA-HQ-OAR-2021-0299 for additional information on the modeling performed by the EPA.

Response Factor. FHR requested a response factor threshold of 10 or less for process streams covered by the AMEL. This request was based on the threshold required by EPA Method 21. However, there is no data that supports that the system would perform adequately if the process streams had a response factor of 10. The CRADA report discusses the importance of response factor and notes that ethylene, which has a response factor of approximately 10 for these sensors, has a weak response and is difficult to detect.[19] According the FHR's application, the streams in the Meta-Xylene process unit have an average response factor of 0.8. The streams in the Mid-Crude process unit have response factors that range from 0.7-3.0. The pilot study and equivalence modeling were conducted using these response factors. Therefore, the AMEL in Section IV of this notice limits the process streams covered by the LDSN to a response factor of three.

4. DRF Specifications

Screening method. The proposed AMEL does not specify an individual screening method (*e.g.,* OGI) that must be used during the PSL investigations. The intent of these investigations is to quickly identify the potential emissions source(s) that triggered the PSL. FHR has requested discretion to use a screening method that best reflects their knowledge of the emission sources within the PSL. In supporting information, FHR provides the following examples of screening technologies that will be utilized for the PSL investigations:

- Photoionization detector (PID): A portable VOC gas detector capable of detecting most VOC gases. This device must have a digital readout with a resolution of 10 ppb or higher, and a response time T90 <30 seconds. It must be certified for use in hazardous locations. This portable instrument is used for fast scanning the area to narrow down the search.

[19] See section 3.2 of the CRADA report located at Docket ID No. EPA-HQ-OAR-2021-0299.

- Flame ionization detector (FID) or PID: An FID or PID compliant with EPA Method 21. This tool is employed in the DRF to pinpoint the leak source and record the leak concentration before and after repair.
- OGI: This tool is used to identify large leaks.

FHR utilized these technologies during the pilot study to identify potential emission sources. The EPA agrees that discretion should be afforded when choosing a screening technology, provided the technologies are capable of identifying VOC gases, and we find these three screening technologies are appropriate for use.

Initial screening investigations. FHR has requested that the initial screening investigations be conducted for 30 minutes; if after 30 minutes no potential leak sources are identified, FHR requests to stop the investigation and wait seven days before conducting another screening investigation. During the pilot study, FHR noted that most leak sources were identified within this 30-minute screening window, and the EPA agrees that this is a sufficient amount of time to identify most leaks that would trigger a PSL. Further, the LDSN continues to collect information, which allows the system to better identify the area where the emissions are located, thus making subsequent screening investigations more likely to result in leak source identification. To ensure the efficacy of the initial screening investigations, the EPA is proposing a requirement to maintain a record of the latitude and longitude coordinates in decimal degrees to an accuracy and precision of five decimals of a degree using the *North American Datum of 1983* for the path taken during the screening investigation, when no leak sources are identified during the 30-minute screening investigation. Additionally, the record would include the date and time stamp of the start and end of the investigation. While the EPA expects that leak sources will be easily identified during the screening investigation, this record will provide valuable information to the EPA that screening was conducted in a manner to maximize identification of the leak source.

Closure of a PSL after 90 days. FHR states that a PSL can be closed if a leak source has not been identified after multiple investigations and it has been 90 days without the unidentified potential leak source worsening (*i.e.,* PSL detection level increasing to twice the previous detection level). FHR further states that one final screening would occur before closing the PSL. If a leak is present and not addressed before closing the PSL, a new PSL notification would be generated by the LDSN. While it is expected that this is a rare occurrence, and FHR did not experience such a situation during the pilot study period, the EPA is concerned about leaks that would go unrepaired. In the LDAR requirements of the applicable subparts, all LDAR-applicable components are monitored on average (1) monthly for pumps, (2) quarterly for valves, and (3) annually for other components types. Noting these frequencies, the EPA finds that it is important to monitor all LDAR components in a PSL with EPA Method 21 if no emission source has been identified within 90 days of the initial notification. All components with instrument readings above the applicable leak definitions specified in Table 2 must be repaired before closing the PSL.

Repair of non-LDAR applicable components. FHR's request states that one advantage to the LDSN-DRF is that leaks from components that are not traditionally subject to LDAR can be detected and repaired. However, FHR does not propose a specific repair deadline by which repairs will be completed for these non-LDAR applicable components. Given that the purpose of LDAR is to both detect and repair leaks, the EPA finds that setting a deadline by which repairs must be made is necessary to reap the benefit of reducing emissions in a timely manner and ensure the LSDN is not confounded by these leaks. Additionally, sources have a general duty to operate equipment in a manner to minimize emissions. Therefore, we are including a requirement that leaks identified on non-LDAR applicable components must be completed and verified within 30 days of identification of the leak.

5. Additional Annual Compliance Demonstration

In their request, FHR stated that random EPA Method 21 sampling could be utilized to verify the effectiveness of the LDSN, including verification that the system is operating with a DTU of 18,000 ppm. This verification would be demonstrated, according to FHR, by the lack of a statistically significant number of EPA Method 21 readings greater than 1.2 times the DTU on applicable LDAR components within the boundary of the LDSN, with the factor of 1.2 representing the variability that occurs with the implementation of EPA Method 21.

The EPA agrees this approach would provide an additional backstop to verifying the efficacy of the LDSN, and as such, has incorporated an additional annual compliance demonstration into the proposed AMEL in section IV.E. The EPA has determined that it is appropriate for FHR to demonstrate the LDSN is operating as expected through this additional annual demonstration because the pilot study had identified missed leaks that were above the DTU, resulting in the need for additional sensor nodes. However, we are also confident that there will be a point where the LDSN is operating as required in this proposed AMEL such that this additional requirement can sunset.

Specifically, the EPA is proposing to require annual EPA Method 21 on all pumps located in the Meta-Xylene and Mid-Crude process units subject to this AMEL. Additionally, the EPA is proposing to require annual EPA Method 21 on a random sample of valves within the verification zone (defined as the zone that is 40 to 50 feet from an individual sensor node) such that at least 20 percent of the total population of valves in the process unit are monitored. If any leaks are identified above 18,000 ppm, except those in an active PSL, the LDSN would be considered out of compliance with the AMEL and corrective actions, including submission of a plan to get back into compliance, would be required. The EPA does propose to sunset this requirement after FHR demonstrates for two consecutive calendar years that no leaks are identified above 18,000 ppm with this annual EPA Method 21 demonstration. Further details are specified in section IV.E of the proposed AMEL.

III. EPA Framework for Streamlining Evaluation of Future LDSN-DRF AMEL Requests

The EPA is also soliciting comment on a general framework sources may use in the future to submit an AMEL request to the EPA for the use of a LDSN-DRF to comply with the LDAR requirements under 40 CFR parts 60, 61, and 63. A similar framework approach was outlined for multipoint ground flares once we started receiving multiple AMEL requests.[20] In recent years, various stakeholder groups[21] have worked to identify general frameworks to aid in an evaluation of equivalency for future alternatives for fugitive emissions detection.

The EPA is proposing the following framework that applicants may use to streamline requests and our review of those requests. This proposed framework will ensure the application provides the information necessary for the EPA to review the request and determine if an equivalent means of emissions limitation is demonstrated by the alternative requested. Determination of equivalence to the applicable LDAR requirements will be evaluated by the following guidelines. The applicant must provide information that is sufficient for demonstrating the AMEL achieves emission reductions that are at least equivalent to the emission reductions that would be achieved by complying with the relevant standards. At a minimum, the application must include the following information:

(1) Site-specific information related to all process unit(s) included in the alternative request.

(a) Site name and location and applicable process units.

(b) Detailed list or table of applicable regulatory subparts for each included process unit, the citations within each subpart that will be replaced or changed by the AMEL and, if changed, how it will be changed, and the authority that allows for use of an AMEL.

[20] 81 FR 23480 (April 21, 2016), pp. 23487-88.
[21] Fox, T.A., Ravikumar, A.P., Hugenholtz, C.H., Zimmerle, D., Barchyn, T.E., Johnson, M.R., Lyon, D. and Taylor, T., 2019. A methane emissions reduction equivalence framework for alternative leak detection and repair programs. *Elem Sci Anth*, 7(1), p.30. DOI: *http://doi.org/10.1525/elementa.369*

(c) Details of the specific equipment or components that will be inspected and repaired as part of the AMEL and whether any equipment within the process unit will not be covered by the AMEL.

(d) A diagram showing the location of each sensor in the process unit and the minimum spacing that achieves equivalence (*i.e.,* the furthest distance a component can be located from a sensor while demonstrating equivalence), taking into consideration multi-level and elevated components.

(e) Information on how management of change (MOC) will be addressed. At a minimum, the MOC must include a determination of whether the changes are within the LDSN coverage area (*i.e.,* within the specified radius of coverage for each individual sensor, including coverage based on elevation) or if changes will result in components added to an applicable EPA Method 21 work practice where the LDSN would not provide coverage. The MOC must also address updates to the diagrams of each sensor or the list of equipment identification numbers, as applicable.

(2) Identification of monitoring techniques used for both the LSDN and DRF.

(a) Identification of the sensors that will be used to detect and locate leaks, including the sensor measurement principle, type, and manufacturer.

(b) Data recording frequency, the minimum data availability for the system and for each sensor, and the process for dealing with periods where data is not available.

(c) Initial and ongoing QA/QC measures and the timeframes for conducting such measures.

(d) Restrictions on where the sensors cannot be used.

(e) How meteorological data will be collected, the specific data that will be collected, and how it will be paired with the sensor data.

(3) Defined work practice.

(a) Description of what triggers action, description of the action(s) that is triggered, and the timeline for performing the action(s).

(b) Definition for when a leak requires repair.

(c) Identification of repair deadlines, including verification of repair.

(d) Description for how repairs will be verified.

(e) Actions that will be taken if an alert is issued by the system, but a leak cannot be found.

(f) Initial and continuous compliance procedures, including recordkeeping and reporting, if the compliance procedures are different than those specified in the applicable subpart(s).

(g) Compliance assurance procedures to ensure the LSDN is operating as designed and corrective actions (including timeframes) in response to findings.

(4) Demonstration of Equivalency

(a) Demonstration of the emission reduction achieved by the alternative work practice including restrictions and downtime. Restrictions should include any conditions which are not demonstrated as equivalent in the request, such as replacement of AVO monitoring or no detectable emissions standards.

(b) Determination of equivalency between the standard work practice and the alternative requested, which may include modeling results.

(c) Results of the pilot study conducted for each unit.

(i) For each PSL generated, the date for each notice, the identified emission source, the date the associated emission source was found for each PSL, the date the emission source was repaired, the EPA Method 21 reading associated with the emission source, and the date of the last required and next required EPA Method 21 inspection for the emission source (or identification of the source as not subject to inspection).

(ii) For each leak found with an EPA Method 21 inspection that was not found by the LDSN-DRF during the pilot study, the date the leak was found, the EPA Method 21 reading for the leak, the date the leak was repaired, and the inspection frequency of the component.

(iii) The results of all EPA Method 21 inspections for the unit during the pilot study.

The EPA solicits comment on all aspects of this framework. We anticipate this framework would enable the Agency to evaluate future AMEL requests for LDSN-DRF installations in a more expeditious timeframe because we anticipate that the information required by the framework would provide us with sufficient information to evaluate future AMEL requests on a case-by-case basis. We note that all aspects of future AMEL requests will still be subject to the notice and comment process.

IV. AMEL for the Mid-Crude and Meta-Xylene Process Units at the FHR West Refinery

Based on the EPA's review of the AMEL request from FHR, we are seeking the public's input on the alternative LDAR work practice proposed for the LDSN-DRF system for the Mid-Crude and Meta-Xylene process units located at FHR's West Refinery in Corpus Christi, Texas. Information provided in the AMEL request, and our evaluation of such information, indicate that the following work practice requirements are necessary for the proposed LDSN-DRF system to achieve emissions reductions at least equivalent to the emissions reductions achieved by the portion of the current LDAR work practice specified in Table 5. If approved, this AMEL would replace the portions of the work practice standards outlined in Table 5. Should the work practice standards be revised, this AMEL would need to be reviewed to determine if it is still equivalent. If in the future the work practice standard is replaced by an emissions standard, an AMEL could not be used in place of the emissions standard.

TABLE 5. SUMMARY OF LDAR REQUIREMENTS TO BE REPLACED WITH THE PROPOSED LDSN-DRF SYSTEM

Applicable rules with LDAR requirements	Citation	Requirement replaced with LDSN-DRF system

NSPS VV	60.482-2(a)(1)	EPA Method 21 monitoring of pumps in light liquid service.
	60.482-7(a) and (c)	EPA Method 21 monitoring of valves in gas/vapor service and in light liquid service.
	60.482-7(h)(3)	EPA Method 21 monitoring at a reduced frequency for valves in gas/vapor service and in light liquid service that are designated as difficult-to-monitor.
	60.486(g)	Schedule of monitoring and leak percentage for valves utilizing skip periods.
NSPS VVa	60.482-2a(a)(1)	EPA Method 21 monitoring of pumps in light liquid service.
	60.482-7a(a) and (c)	EPA Method 21 monitoring of valves in gas/vapor service and in light liquid service.
	60.482-7a(h)(3)	EPA Method 21 monitoring at a reduced frequency for valves in gas/vapor service and in light liquid service that are designated as difficult-to-monitor.
	60.482-11a(a), (b), (b)(1), (b)(3), (b)(3)(i)-(iv), and (c)	EPA Method 21 monitoring of connectors in gas/vapor service and in light liquid service.
	60.486a(g)	Schedule of monitoring and leak percentage for valves utilizing skip periods.
HON	63.163(b)(1)	EPA Method 21 monitoring of pumps in light liquid service.
	63.168(b)-(d)	EPA Method 21 monitoring of valves in gas/vapor service and in light liquid service.
	63.168(f)(3)	EPA Method 21 monitoring following successful repair of valves in gas/vapor service and in light liquid service.
	63.173(a)(1)	EPA Method 21 monitoring of agitators in gas/vapor service and in light liquid service.
	63.173(h)	EPA Method 21 monitoring at a reduced frequency for agitators in gas/vapor service and in light liquid service that are designated as difficult-to-monitor.
	63.174(a)-(c)	EPA Method 21 monitoring of connectors in gas/vapor service and in light liquid service.
	63.175(c)(3), (d)(1), and (d)(4)(ii)	Quality improvement program for valves where the leak rate is equal to or exceeds 2%.
	63.178(c)(1)-(3)	EPA Method 21 monitoring of components using the alternative means of emission limitation for batch processes.
	63.181(b)(1)(ii)	Schedule by process unit for connector monitoring.
	63.181(b)(7)(i) and (ii)	Identification, explanation, and monitoring schedule of difficult-to-monitor components.
	63.181(d)(7)	Listing of connectors subject to EPA Method 21 monitoring.
	63.181(d)(8)	EPA Method 21 monitoring for batch processes.

In order to achieve emission reductions at least equivalent to those achieved in the requirements listed in Table 5, the proposed LDSN-DRF must meet the following requirements.

A. LDSN Specifications

(a) *Sensor selection.* A sensor meeting the following specifications is required:

(1) The sensor must respond to the compounds being processed. The average response factor of each process stream must be less than or equal to three. If the average response factor of a process stream is greater than three, the components in that service are not covered by this AMEL.

(2) The sensor must be capable of maintaining a detection floor of less than 10 ppbe on a rolling 10-minute average, when adjusted for the system response to the most recent successful bump test conducted in accordance with IV.A(e)(2). The detection floor is determined at three times the standard deviation of the previous 10 minutes of data excluding excursions related to emissions peaks.

$$Detection\ Floor_{Sensor\ n} = 3\ \times\ SD_{Local\ n} \times \frac{Bump\ Test\ Gas\ Conc}{Bump\ Test\ Response_{Sensor\ n}}$$

Detection Floor $_{\text{Sensor n}}$ = Calculated detection floor of sensor n (ppbe)

$SD_{\text{Local n}}$ = Local (previous ten minutes) standard deviation of measurements excluding transient spikes (sensor raw output typically mV)

Bump Test Gas Conc = Concentration of the isobutylene bump test gas per manufacturer (ppb)

Bump Test Response $_{\text{Sensor n}}$ = the peak of the sensor response over the baseline to the most recent bump test (sensor raw output typically mV)

(3) The sensor must record data at a rate of once per second.

(4) Records of sensor selection must be maintained as specified in IV.C(c) and records of detection floor must be maintained as specified in IV.C(g).

(b) *Sensor placement.* The sensor placement must meet the following specifications:

(1) The Mid-Crude process unit must have a minimum of 44 sensors and the Meta-Xylene process unit must have a minimum of 10 sensors. All components covered by the LDSN-DRF must be no further than 50 feet from a sensor node in the horizontal plane, and sensor nodes must be placed at least every 20 feet vertically. Sensor nodes must be placed and must remain in accordance with the single level and multi-level records required in IV.C(d).

(2) As part of the management of change procedure, FHR must identify if the changes to process equipment are within the 50-foot radius and 20-foot elevation of any single sensor within the process unit or whether new process streams exist within the LDSN. FHR must identify any LDAR-applicable components associated with the changes to the process equipment that are outside of the 50-foot radius and 20-foot elevation requirements for the LDSN or that contain process streams with a response factor of greater than three and comply with the standard EPA Method 21 LDAR requirements for those components as required in the applicable subpart(s). FHR must maintain the management of change records in IV.C(e). review the placement of sensors and the need for additional sensors when there are changes to process equipment and systems that are expected to affect the DTU as part of the management of change procedures.

(c) *PSL notifications.* The system must perform a 72-hour lookback a minimum of once per day that includes the previous 24-hour period to determine the percent of time positive detections were registered. Positive detections are defined as peak excursions above the detection floor. If positive detections are registered for at least 5 percent of the time during the rolling 72-hour lookback, a PSL notification must be issued. Records of raw sensor readings and PSL notifications must be maintained in accordance with IV.C(g) and (i), respectively.

(d) *Meteorological Data.* FHR must continuously collect wind speed and wind direction data in each process unit at least once every 15 minutes. FHR must maintain records in accordance with IV.C(h).

(e) *QA/QC*. The following QA/QC must be employed for the sensors in the network:

(1) Sensors must be calibrated by the manufacturer prior to deployment. Once installed, each sensor must be tested for responsivity and wireless communication by challenging it with isobutylene gas or another appropriate standard. FHR must maintain records in accordance with IV.C(f).

(2) FHR must conduct a bump test on each sensor quarterly. At a minimum, quarterly bump tests must be conducted no more than 100 days apart.

(i) The bump test must be conducted with isobutylene gas or another appropriate standard and include a mechanism to provide nominally ambient level moisture to the gas.

(ii) The bump test is successful if the response of the sensor exceeds 50 percent of the nominal value of the standard and the adjusted detection floor does not exceed 10 ppbe. The bump test may be repeated up to two additional times if the first bump test is unsuccessful.

(iii) If the bump test is unsuccessful after the third try, the sensor must be recalibrated or replaced with a calibrated sensor within 24 hours of the third unsuccessful try. After recalibration, a new bump test must be conducted following the procedure outlined above.

(iv) FHR must maintain records of the bump test in accordance with IV.C(f) and records of the detection floor must be maintained in accordance with IV.C(g).

(3) The health of each sensor must be confirmed for power and data transmission at least once every 15 minutes. Data transmission, which includes data recorded by the sensor every second as noted in IV.A(a)(3), must occur at least once every 15 minutes. The rolling 10-minute average detection floor data collected in accordance with IV.A(a)(2) must be updated with each new minute of data every 15 minutes. Sensors that fail to collect data in accordance with IV.A(a)(2) and (3) and transmit data in accordance with this paragraph must be reset, repaired, or replaced. Following a sensor reset or repair, FHR must test the responsivity and wireless communication of the sensor through a bump test according to the procedure specified in IV.A(e)(2). FHR must maintain records of sensor health in accordance with IV.C(f).

(4) At least once each calendar quarter, conduct a check for wind direction to ensure the wind sensor is properly oriented to the north. If the wind sensor is not within 15 degrees of true north, it must be adjusted to point to true north. At a minimum, quarterly wind direction checks must be conducted no more than 100 days apart. The results of the quarterly check for wind direction must be kept in accordance with IV.C(h).

(f) *Downtime*. The sensor network must continuously collect data as specified in paragraph IV.A(e)(3), except as specified in this paragraph:

(1) The rolling 12-month average operational downtime of each individual sensor must be less than or equal to 10 percent.

(2) Operational downtime is defined as a period of time for which the sensor fails to collect or transmit data as specified in IV.A(e)(3) or the sensor is out of control as specified in IV.A(f)(3).

(3) A sensor is out of control if it fails a bump test or if the sensor output is outside of range. The beginning of the out of control period for a failed bump test is defined as the time of the failure of a bump test. The end of the out-of-control period is defined as the time when either the sensor is recalibrated and passes a bump test, or a new sensor is installed and passes the responsivity and communication challenge. The out-of-control period for a sensor outside of range starts at the time when the sensor first reads outside of range and ends when the sensor reads within range again.

(4) The downtime for each sensor must be calculated each calendar month. Once 12 months of data are available, at the end of each calendar month, FHR must calculate the 12-month average by averaging that month with the previous 11 calendar months. FHR must determine the rolling 12-month average by recalculating the 12-month average at the end of each month.

(5) FHR must maintain records of the downtime for each sensor in accordance with IV.C(m).

B. DRF Specifications

When a new PSL notification is received, the following actions apply:

(a) An initial screening investigation must begin within three calendar days of receiving a new PSL notification.

(1) The initial screening investigation must utilize technology that can detect hydrocarbons or that is capable of responding to the compounds or mixture of compounds in the process streams at levels appropriate for locating leaks. This technology must be maintained per manufacturer recommendations. Technologies that the EPA finds appropriate for use are PIDs, FIDs, and OGI cameras.

(2) Each potential leak source identified in the initial screening investigation must be monitored by EPA Method 21 as specified in section 60.485a(b) of 40 CFR part 60, subpart VVa.

(3) If an instrument reading equal to or greater than the concentrations listed in Table 2 is measured, a leak is detected. The maximum instrument reading must be recorded for each leak identified. A weatherproof and readily visible identification shall be attached to the leaking equipment. The identification may be removed once the component has been repaired, with the repair confirmed through follow up EPA Method 21 monitoring.

(4) When a leak is detected, it shall be repaired as specified in the applicable subpart(s), except as specified in this paragraph. If the leak source is not applicable to LDAR, repairs must be completed and verified within 30 calendar days of identification. If the leak source is determined to be associated with authorized emissions (*e.g.,* regulated emissions from a stack or process equipment that are not fugitive emissions), the facility must document this information for the record, and the PSL can be closed.

(5) If a single leak is detected at 3,000 ppm or greater by EPA Method 21, the investigation is complete, and the PSL can be closed once the leak has been repaired in accordance with the applicable subpart(s).

(6) If a total of three leaks are detected below 3,000 ppm but above the leak definitions specified in Table 2 by EPA Method 21, the investigation is complete, and the PSL can be closed once the leaks have been repaired in accordance with the applicable subpart(s).

(7) For each initial screening investigation in which a potential leak source is not identified after 30 minutes of active screening within the PSL, record the latitude and longitude coordinates in decimal degrees to an accuracy and precision of five decimals of a degree using the *North American Datum of 1983* for the path taken during the screening investigation. Include the date and time stamp of the start and end of the investigation. The PSL must remain open, but the initial screening investigation may stop.

(b) A second screening investigation must be conducted within seven calendar days of stopping the initial screening investigation as described in IV.B(a)(7). The conditions specified in IV.B(a)(1) through (6) apply to this second screening investigation.

(c) If no potential leak sources are identified during the second screening investigation, and the PSL detection level increases by two times the initial detection level, a PSL update notification must be sent to facility personnel based on the higher detection level. A new screening investigation must occur within three calendar days of receiving the PSL update notification with the higher detection level, following the conditions specified in paragraphs IV.B(a)(1) through (6). This step must be repeated every time the PSL notification is sent, and a leak source is not found on the second screening. The PSL must remain open until the conditions in IV.B(b)(5) or (6) are met.

(d) If no potential leak source has been identified following the screening investigations in IV.B(b) and (c) and 90 days have passed since the original PSL notification, all sensors used to create the PSL must be bump tested in accordance with IV.A(e)(2) and a full survey of the LDAR-applicable components within the PSL must be conducted with EPA Method 21 within 10 calendar days. A leak is defined by the applicable subpart(s). All leaks identified during this survey must be repaired and verified after which the PSL will be closed. If no leaks are identified in this final screening, “no leak source found” must be recorded and the PSL will be closed.

(e) FHR must maintain the records in accordance with IV.C(i)-(l).

C. Recordkeeping

The following records related to the LDSN-DRF must be maintained in addition to the records from the relevant subparts, except as noted in Table 5.

(a) Fugitive Emission Management Plan (FEMP) detailing the boundaries of the Meta-Xylene and Mid-Crude process units which are complying with this AMEL. The plan must include the records for the LDSN specified in paragraph IV.C(d), a list of identification numbers for equipment subject to the EPA Method 21, no detectable emissions, or AVO work practice requirements of the applicable subparts, and a map clearly depicting which areas in each process unit are covered by the LDSN-DRF and which are covered by the EPA Method 21, no detectable emissions, or AVO work practices.

(b) Records of the sensor response factors for the applicable process streams.

(c) Manufacturer, measurement principle, response factors, and detection level for each sensor.

(d) Records of sensor placement, including geographic information system (GIS) coordinates and elevation of the sensor from the ground, and diagrams showing the location of each sensor and the detection radius of each sensor. One diagram must show all sensors, with an indication of the level each sensor is located on. Additional diagrams showing sensor layout must be provided for each level of the process unit.

(e) Records of each MOC. For each MOC, records of the determination that either IV.C(e)(1) or (e)(2) applies. The MOC must also address updates to the diagrams in the FEMP of each sensor or the list of equipment identification numbers, as applicable:

(1) The changes are within the LDSN coverage area (*i.e.,* within 50-foot radius and 20-foot elevation of coverage for each individual sensor) and the response factor of any new process streams is less than or equal to three; or

(2) The components will be added to an applicable EPA Method 21, no detectable emissions, or AVO work practice where the LDSN would not provide coverage.

(f) Records of initial and subsequent calibrations, bump tests for responsivity and wireless communication initially and upon sensor repair or reset, quarterly bump tests, bump tests prior to PSL closure where leaks have not been found within 90 days, and bump tests following out of control periods, including dates and results of each calibration and bump test, as well as a description of any required corrective action and the date the corrective action was performed. Records of calibration gases used for the bump tests, the ambient moisture level during the bump tests, and the mechanism for providing nominally ambient level moisture to the gas during the bump tests. Records of sensor health related to power and data transmission.

(g) Raw sensor readings. Additionally, for each sensor, the percent of time positive detections were registered during the 72-hour lookback must be recorded each day and the minimum, average, and maximum detection floor.

(h) Network meteorological data, including wind direction and wind speed. Record the results of each quarterly check of the wind sensor orientation. Record the latitude and longitude coordinates of the original location of the wind sensor. The wind sensor must remain within 300 feet of the original location. Record each movement of the wind sensor, the latitude and longitude coordinates for the new location, and the distance in feet between the new location and the original location.

(i) PSL documentation. For each PSL, the record must include the notification date, investigation start date, investigation results including the date each leak was found, leaking component location description, EPA Method 21 reading, repair action taken, date of repair, and EPA Method 21 reading after repair.

(j) PSL documentation where PSL is not closed out after the initial investigation. For each PSL that cannot be closed out after the initial investigation, a record must include the initial screening performed, including the latitude and longitude coordinates indicating the path taken during the screening investigation, the start and end date and times of the investigation, any OGI video taken during the investigation, and any Method 21 readings observed during the investigation.

(k) If a PSL is caused by an authorized emission source, the documentation must include the notification date, investigation start date, investigation results, emission source identification, and description of "authorized emissions".

(l) Records of PSLs closed out where no cause of the PSL was determined.

(m) For each sensor, the date and time of the beginning and end of each period of operational downtime.

(n) For each additional annual compliance demonstration conducted under the compliance assurance provisions of IV.E below, the documentation must include the date of survey, the plot plan showing the verification zone of each sensor, the list of valves in the verification zones, the total population of valves in the process unit, the EPA Method 21 reading for each valve and pump monitored, and the corrective action taken if the LDSN is found to be in violation of the sensor placement requirements.

(o) Records of deviations where a deviation means FHR fails to meet any requirement or obligation established in this AMEL or fails to meet any term or condition that is adopted to implement an applicable requirement or obligation in this AMEL and that is included in the operating permit for the Mid-Crude or Meta-Xylene process units at FHR.

D. Reporting

Semiannual reports must be submitted via the Compliance and Emissions Reporting Data Interface (CEDRI), which can be accessed through the EPA's Central Data Exchange (CDX) (*https://cdx.epa.gov*) following the requirements in section 63.9(k). Unless the report is submitted by electronic media, via mail it must be addressed to the attention of the Group Leader of the Refining and Chemicals Group. Semiannual reports must include the following information:

(a) All of the information required in the relevant subparts.

(b) For each PSL, the notification date, investigation start date, investigation results including the date each leak was found, type of component, EPA Method 21 reading, and date of repair.

(c) The number of PSLs that were closed out where no cause of the PSL was determined.

(d) The operational downtime percentage for each sensor determined each month.

(e) For each sensor that fails a bump test, identification of the sensor, date of failed bump test, and corrective action taken.

(f) Any changes to the sensor network, including those resulting from the compliance assurance actions in IV.E.

(g) The date of each EPA Method 21 survey for the additional annual compliance demonstration in IV.E, number of valves and pumps monitored, number of leaks identified, number of leaks identified above 18,000 ppm, corrective action taken if leaks are identified above 18,000 ppm and the date the corrective action was taken or is planned to be taken.

(h) Once the criteria in IV.E(b) is met, a statement that FHR has met the criteria and additional annual compliance demonstration are no longer required.

(i) Reports of deviations recorded under IV.C(o) which occurred in the semi-annual reporting period, including the date, start time, duration, description of the deviation, and corrective active.

E. Additional Annual Compliance Demonstration

In addition to continuous compliance with the LDSN-DRF as required by the sections IV.A-D, the following annual compliance demonstration actions are required for the LDSN-DRF system located in the Meta-Xylene and Mid-Crude process units:

(a) Method 21 of appendix A-7 of part 60 must be conducted in each process unit equipped with the LDSN-DRF according to the following requirements:

(1) The first survey must be conducted within 12 calendar months of approval of the AMEL. Subsequent surveys must be conducted no sooner than 10 calendar months and no later than 12 calendar months after the preceding survey.

(2) Identify each verification zone on a plot plan. The verification zone is the area between the radii that are 45 and 50 feet from each individual sensor. Monitor the valves located in these verification zones as described in IV.E(a)(2)(i) through (v) using EPA Method 21 as specified in section 60.485a(b) of 40 CFR part 60, subpart VVa, with the exception that the high scale calibration gas must be approximately 20,000 ppm.

(i) Determine the total number of valves located in the individual process unit. The minimum number of valves monitored must equal 20 percent of the total population of valves in the process unit.

(ii) Determine the total number of valves that occur in only one sensor verification zone (*i.e.,* verification zones that have no overlap with other verification zones). If the number of valves that occur in only one sensor verification zone is greater than the minimum number of valves that must be monitored, monitor a random selection of these valves according to IV.E(a)(2)(v).

(iii) If the number of valves that occur in only one sensor verification zone is less than the minimum number of valves that must be monitored, determine the total number of valves that occur in all verification zones, including those that overlap. If the total number of valves in all verification zones is greater than the minimum number of valves that must be monitored, monitor all the valves that occur in only one sensor verification zone. Additionally, monitor a random selection of valves, chosen in accordance with IV.E(a)(2)(v), that appear in verification zones that overlap until the 20 percent minimum is achieved.

(iv) If the number of valves in all verification zones is less than 20 percent of the total population, then monitor all of the valves in all verification zones. Additionally, monitor a random sample of additional valves within the LDSN but outside of the verification zones, chosen in accordance with IV.E (a)(2)(v), until the 20 percent minimum is achieved.

(v) Random sampling of valves. To determine the random selection of valves to monitor, determine the population of valves that must be randomly sampled as determined in IV.E(a)(2)(ii), (iii), or (iv) (*i.e.,* 20 percent of the total valve population or 20 percent of the total valve population minus the number of valves in the verification zones). Divide the population of valves by the number of valves that must be sampled and round to the nearest integer to establish the sampling interval. Using the valve IDs sequentially, monitor valves at this sequential interval (*e.g.,* every 5 valves). Alternatively, use the valve IDs and a random number generator to determine the valves to monitor. Each survey conducted under IV.E(a)(1) must start on a different valve ID such that the same population of valves is not monitored in each survey.

(3) Monitor each pump located in the process unit using EPA Method 21 as specified in section 60.485a(b) of 40 CFR part 60, subpart VVa.

(4) For purposes of this monitoring, a leak is identified as an instrument reading above the leak definitions in Table 2 of this AMEL. All identified leaks must be repaired within 15 calendar days of detection, with a first attempt completed within five calendar days of detection.

(5) If any components are identified with EPA Method 21 screening values above 18,000 ppm, the LDSN is not in compliance with the approved AMEL, except components under current investigations in an active PSL with screening values above 18,000 ppm may be excluded provided the PSL has been open for less than 14 days or the components have been identified and placed on delay of repair. The period of noncompliance with the AMEL extends until the actions in IV.E(5)(i)-(ii) are completed and the actions in IV.E(5)(iii) result in all components identified with EPA Method 21 to have screening values less than or equal to 18,000 ppm.

(i) Within 30 days of the survey conducted in IV.E(a)(4), which identifies components with EPA Method 21 screening values above 18,000 ppm, FHR must submit a plan to revise the sensor network to *CCG-AWP@epa.gov.* Revisions to the sensor network must include the addition of new sensors to reduce the detection radius of each sensor, location changes of any previously deployed sensors, and/or the deployment of a different sensor type. The plan must also include the location of the controlled release specified in IV.E(a)(5)(ii) to verify the performance of the revised network.

(ii) Within 30 days of completing the approved sensor network changes, FHR must conduct a controlled release of 1.4 g/hr isobutylene to determine the performance of the network.

(iii) Within 60 days of completing the approved sensor network changes, FHR must repeat the actions in IV.E(a)(2) through (a)(4). If any components are identified with EPA Method 21 screening values above 18,000 ppm, FHR remains in noncompliance with the approved AMEL, and FHR must repeat the actions required in IV.E(a)(5)(i) and (ii).

(b) FHR may stop conducting the additional annual compliance demonstration required in IV.E(a) if no leaks above 18,000 ppm are identified with Method 21 of appendix A-7 of part 60 over a period of 2 consecutive calendar years.

V. Request for Comments

The EPA solicits comment on all aspects of this AMEL request. We specifically seek comment regarding whether the proposed alternative LDAR requirements listed in Section IV of this preamble would be adequate for ensuring the LDSN-DRF will achieve detection and location of component-level leaks. Additionally, we seek comment regarding whether the proposed alternative will achieve emissions reductions at least equivalent to the emissions reductions that would be achieved through compliance with the applicable LDAR requirements in 40 CFR 60 Subparts VV, VVa, GGG, GGGa; 63 Subparts H and CC. Finally, as noted in Section III, we also solicit comment on the EPA's proposed framework for evaluation of future

LDSN-DRF AMEL requests. Commenters should include data or specific examples in support of their comments.

Panagiotis Tsirigotis,

Director,

Office of Air Quality Planning and Standards.

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